Upper Mississippi River Nine-Foot Channel Project,
Lock and Dam Complex Number 20
Spanning the Mississippi River between
Canton, Missouri, and Meyer, Illinois,
Lewis County, Missouri
(Adams County, Illinois)

HAER No. MO-34

HAER
MO,
56-CANT,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
U. S. Department of the Interior
P. O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENCINEERINC RECORD

HAER MO, 56-CANT, 1-

Upper Mississippi River Nine-Foot Channel Project, Lock and Dam Complex Number 20

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Location: Spanning the Mississippi River between Canton, Lewis County, Missouri, and Meyer, Adams County, Illinois; 343.2 river miles upstream from the confluence of the Ohio and Mississippi rivers. The complex stretches across the river at a point where the valley is quite wide, about 5 miles at the level of the lock and dam. A levee and the Cregory Diversion Ditch separate the complex from the small town of Canton, Missouri. The esplanade lies just riverward of the diversion ditch. The lock is just riverward of the esplanade with the movable section of the dam tying to the easternmost lock wall and extending to the Illinois shore. Corps of Engineers drawings numbers M-L 20 10/1; 10/2; 10/4; HAER photograph numbers MO-34-1 through MO-34-33.

Dates of Construction: 1932-1935

Present Owner: U. S. Covernment
Rock Island District
Corps of Engineers

Present Use: River navigation/hydrology control

Significance: The U. S. Army Corps of Engineers Nine-Foot Channel Project (1927-1940) represents the culmination of a 100-year effort to improve the navigability of the Upper Mississippi River between the mouth of the Missouri River and Minneapolis, Minnesota. This specific project arose as a response to the farm crisis of the 1920s. Proponents of the New Deal adopted the project and gave speed to its construction as a means of providing public employment during the more general depression of the 1930s. By the 1940s, the completed project had converted over 650 miles of free-flowing river into a series of interconnected reservoirs which ensured enough water for fully loaded modern boats and barges to navigate the system. This constituted a significant alteration of the natural environment of the Upper Mississippi River. However, the project also brought economic benefits to the communities along and around the river corridor and lead to new recreational opportunities for the entire region.

The Upper Mississippi River Nine-Foot Channel Project inaugurated a new development in slack-water navigation system dam practice in the United States: the adoption of a non-navigable dam containing both roller and Tainter gates. Prior to the Corps' 1930 decision to build non-navigable dams on the Upper Mississippi River, United States Army engineering practice had, nearly universally, been to construct navigable dams, permitting open-river navigation at higher river stages. By 1930, European engineers had been using roller gates in dams extensively for over 25 years. However, only ten such structures had been built in the United States, and these were all located on reaches of rivers where ensuring navigability of any sort was not a design concern. It was not until 1925-1926 that civilian engineers pioneered the use, in the United States, of roller gates in combination with other types of gates. Most of the Corps' Upper Mississippi River project dam designs expanded upon this development, incorporating both roller and Tainter gates. The Corps' shift from navigable to non-navigable dams demonstrate the influence of shipping techniques on navigable waterway improvement technology. It also exemplifies the cautious nature of American Army engineers response to changes in shipping. The Corps' choice of this particular type of non-navigable movable dam illustrates the influence of the hydraulic characteristics of individual rivers on the selection of waterway improvement technologies. It also evidences the manner in which critical engineering design developments are disseminated and become accepted.

Ironically, the Upper Mississippi River Nine-Foot Channel Project also resulted in the obsolescence, by the project's end, of combination roller and Tainter gate dams. Technological advances resulting from the research and development incidental to the design and construction of the 26 lock and dam systems in this project enabled U. S. Army Corps of Engineers to develop both submersible and non-submersible Tainter gates which nearly matched the capabilities of the roller gates. Once these less expensive and easier operated and maintained gates had been developed, American engineers ceased designing or constructing combination roller and Tainter gate dams. The Corps'

creation of a new dam type and its subsequent obsolescence during the course of a single project dramatically illustrates both the evolutionary nature of American engineering in general and the Nine-Foot Channel Project in particular (Text, pages 11 and 49-50. See HAER No. IA-23 for complete history, footnotes and bibliography).

Historian: Mary Yeater Rathbun

August 1988

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Dates of Erection: 1932-1935

2. Architect/Engineer: U. S. Corps of Engineers, Rock Island District

3. Original and Subsequent Owners: U. S. Government--Rock Island District, Army Corps of Engineers

4. Builders, Contractors, Suppliers:

General Contractor--Lock Construction: Maxon Construction Company, Dayton, Ohio

Subcontractors:

F. C. Sammons Co., Huntington, West Virginia	Rock excavation, channeling, drill holes, and fill
R. C. Mahon Company, Detroit, Michigan	Fabrication, erection, and placement of structural steel and machinery
Joseph T. Ryerson & Sons	Reinforcing steel
Michelmann Steel Construction Co.	Reinforcing steel
Inland Steel Company, Chicago, Illinois	Structural steel, reinforcing steel, steel sheet piling and miscellaneous steel
Graybar Electric Company, Davenport, Iowa	Electrical conduits and condulets
Crane Company, Davenport, Iowa	Pipe and fittings
E. E. Douther Iron Company	Cooper sealing strip
Ceco Steel & Wire Products	Expansion joint material
Universal-Atlas Cement Company	Cement
Alph Portland Cement Company	Cement
Dewey Portland Cement Company, Davenport, Iowa	Cement
Missouri Portland Cement Company	Cement
Keokuk Sand & Gravel Company, Keokuk, Iowa	Dredging, coarse aggregate, fine aggregate and fill
Joy Tarbell Lumber Company	Oak timber
Laclede-Christy Clay Products Co.	12-inch V. C. pipe
W. C. Magruder	Tile gauges
W. A. Briggs Bitumen Company	Paint of shop coat for steel

International Clay Manufacturing Company...Castings and miscellaneous steel parts of operating machinery
Frazier Paint Company.....Paint
Eaton Spring Company.....Springs
The Nelson Company.....Brass pipe and fittings
United Forge and Machine Company...Forged steel collars
Stanley Steel Company.....Cold rolled steel
Gray Hub Company.....Rings, collars and wedges
The Alemite Company.....Grease fittings for lock and operating machinery
Nelson Company.....Handrailing
Republic Steel Corporation.....Rivets, bolts, screws, washers, and nuts
Kerlow Steel Flooring Company.....Grating
Illinois Steel Company.....Corrosion resisting steel and nickel steel
Bethlehem Steel Company.....Protection angle
Detroit, Michigan
Steel Sales Company.....Copper-nickel alloy steel
Carnegie Steel Company.....Structural steel for lock and operating machinery
Luken Steel Company.....Plates
American Bridge Company.....Buckle plates & pattern of recessed nuts for operating machinery
U. S. Rubber Company.....Rubber seal strips
American Brass Company.....Tobin bronze
M. F. Doty Company.....Cast iron manhole covers, frames, junction boxes, pull boxes
Novo Engine Company.....Cast iron manhole frames & covers, junction boxes and pull boxes
Standard Steel Company.....Protection angle and armor castings, steel forgings-nickel steel and nickel steel forgings for operating machinery
National Mallable & Steel Casting Company.....Castings for operating machinery
Century Electric Company.....Motors for operating machinery
Foote Bros. Gear & Machine Co.....Parts of valve motors
Commercial Steel Casting Company...Sector arms bearings-spring castings, gears & pins for operating machinery
Union Drawn Steel Company.....Cold rolled steel for operating machinery
Westinghouse Electric Mfg. Co.....Gears for operating machinery
Dickerson Steel Company.....Nickel steel & chrome-moly, steel for operating machinery

Hewitt Meals Corporation.....Babbit metal for operating machinery
Central Ohio Paper Company.....Paper shims for operating machinery
Dayton Forge & Heat Treating Co....Eyebolts for operating machinery
American Spiral Spring & Mfg. Co...Phosphor bronze washers and bushing for operating machinery
Jones & Laughlin Steel Corp.....Ship channels for operating machinery
Erie Bolt & Nut Company.....Screws for operating machinery
Paragon Tool and Supply Company....Screws for operating machinery
Stsndard Pattern Works.....Patterns for operating machinery
Cleveland City Forge & Iron Co.....Turnbuckles for operating machinery
Camden Forge Company.....Forgings for operating machinery
Capital Manufacturing & Supply Co..Pipe for operating machinery
Dodge Manufacturing Corporation....Cable drums for operating machinery
Kirk & Blum Mfg. Company.....Gear housing & brass plugs for operating machinery
Bayonne Bolt Company.....Bolts for operating machinery
Mackintosk-Hamphill Compsny.....Sector gears for operating machinery
Federal Pattern Works.....Patterns for operating machinery

General Contractor--Dam Construction: S. A. Healy Company, Detroit, Michigan and Davenport, Iowa

Subcontractors:

American Bridge Company.....Fabrication, erection, and placement of service bridge and tainter gates
S. Morgan Smith Co.....Fabrication, erection, and placement roller gates
York, Pennsylvania
General Electric Company.....Motors and brakes for roller gate hoists

General Contractor--Supply and Installation of Flat Car on Service Bridge Track: Atlas Car and Mfg. Co., Clevelsnd, Ohio (wholly owned subsidisry of Atlas Bolt and Screw Co., Cleveland, Ohio)

General Contractor--Furnish two Electric Motor-operated Traveling Tainter Gate Hoists for Dam 20: Lakeside Bridge & Steel Company, Milwaukee, Wisconsin

General Contractor--Furnish Gasoline-operated Traveling Tainter Gate Hoist for Dam 20: Link-Belt Co., Chicago, Illinois

General Contractor--Furnish and Deliver Structural and Machine Parts for Raising Motors and Brakes: Goodman Manufacturing Company, Chicago, Illinois

General Contractor--Power, Control, and Lighting System Construction: Fries-Walter Co., Chicago, Illinois

Subcontractor: Cutler-Hammer, Inc., Milwaukee, Wisconsin (replaced General Electric Company as supplies of electrical equipment)

5. Original Plans and Construction:

U. S. Army Corps of Engineers, Rock Island District, contract drawings for lock signed by senior engineer Herbert G. McCormick, contract drawings for dam signed by associate engineer Edwin E. Abbott; direct supervision of construction, John H. Piel, resident engineer.

6. Alterations and Additions:

Item	Year
Construction-500-foot cell foundation concrete extension to upstream end of river wall of lock	1940-1942
Land wall and lock gate handrails lowered by one rail and new handrail made from salvaged materials installed on both edges of each lock wall and on upstream side of walkways on top of lock gates	ca. 1945
Construction-handrail on upstream side of dam service bridge	ca. 1945
Construction-upstream guidewall extension	1951
Removed operating machinery from lock wall machinery pits and wells	ca. 1955
Filled additional area behind land wall	ca. 1955
Addition-boat launches on lock walls	ca. 1955
Construction-frame air-lock vestibule at upstream end door of central control station	ca. 1970
Replacement-haulage units	ca. 1971 and 1973

Construction-metal and glass shelters around land wall control cabinets and at end of the guidewall of lock	ca. 1972
Removal-Lockmaster/Assistant Lockmaster residences from esplanade	ca. 1975
Removal-standby generator for machinery room of central control station	ca. 1975
Construction-emergency generator building	ca. 1975
Replacement--wooden plank hatches on dam service bridge with aluminum ones	ca. 1979
Installation-traveling mooring kevels extending length of guidewalls of lock	1980
Construction-new workshop building	1980-81
Construction-concrete, metal, and fiberglass covers over machine pits on main lock	1983
Replacement-crane on dam	1983-84
Replacement-light posts and light fixtures around lock	1984
Major complex rehabilitation project: remove, repair, and replace major portions of all 3 sets of miter gates on lock; all lock walls resurfaced; miter gate machinery replace; tainter valve machinery replaced; lock electrical system replaced; removal of central control panel from central control station; scour protection added to lock; roller gates and tainter gates mechanized; one hoist car rehabilitated; dam piers and sills resurfaced; service bridge renewed	1986-88

B. Historical Context:

The special board of engineers which initially designed the Nine-Foot Channel Project between 1929 and 1931 saw the construction of Lock and Dam Complex 20 as one of the highest priority items within the context of the overall project. The board placed complex 20, like complex 15, in the

first group of projects to be constructed, those necessary, in the board's opinion, to care for existing commerce.

Lock and Dam Complex Number 20 was the second complex designed and built in the Rock Island District. Experiments abounded as Rock Island District designers worked their way towards standardized project elements. One significant chaNge experimented with at Lock and Dam Complex Number 20 that influenced the design of all the subsequent complexes relates to the tainter gate operating machinery on the dam. Dam 20 was the first dam designed and constructed in the Rock Island District that included tainter gates. Its original design called for all of its 40 tainter gates to be operated by specially-designed hoist cars traveling on the dam's service bridge. However, the Rock Island District modified the design for two of the tainter gates. The engineers designed these two to be individually operated, using line shafts and motors housed in installations above each gate. All subsequent dams designed for the Nine-Foot Channel Project, regardless of the district in which they were designed or built, utilized line shafts and motors housed over each tainter gate to individually operate those gates. As recently as 1984, it was possible for visitors to the complex to easily identify visually the two gates where this experiment was conducted. They were still the only two gates with individual operating equipment. However, beginning in 1986 when the district began its major rehabilitation of Lock 20, it also began a major rehabilitation of Dam 20. In this program, the district is individually mechanizing the 30 tainter gates on Dam 20 which were previously operated by the hoist car and is replacing the experimental individual operating machinery on the two tainter gates which had it with matching new individual hoist equipment. Because these changes are being phased in gradually, so that the dam can continue to be operated during the changeover, the district is, however, also rehabilitating one of the original specially-designed hoist cars provided by Lakeside Bridge & Steel Company of Milwaukee, Wisconsin. The district is replacing the operating machinery on the southernmost 22 tainter gates (that is, the 22 tainter gates closes to the lock) first. These gates are most directly in the channel and are operated most. The other 18 tainter gates are generally only operated during a flood. The rehabilitated hoist car is being used to operate these less frequently operated gates until such time as the total rehabilitation of the dam is completed. The other two hoist-cars are being left on the site. One, the gasoline-operated car, designed and furnished by the Link-Belt Company of Chicago, has been left sitting on the site since it was delivered in 1935. It has not been used by the lock and dam staff for over 40 years. In fact, it has not been carried on the complex property list for several years. The other non-rehabilitated electric motor-operated hoist car will presumably fall into that same category soon, now that it also is no longer to be used.

Most specific items of engineering significance at this complex relate to it being one of the first group of complexes designed for the Corps of Engineers 1927-1940 Upper Mississippi River Nine-Foot Channel Project (the others being Lock and Dam Complex Numbers 15 and 4) and in the second pair of complexes built in the project (the other being Lock and Dam Complex Number 4 in the St. Paul District). Many things are either totally unique or prototypes from which designs for subsequent complexes followed. The major innovations at Lock 20 that had engineering significance for the rest of the system relate, as discussed above, to the miter gates. The dam is unusual not only because it utilized locomotive hoist cars to operate 38 of its tainter gates, but because it includes the only 1c roller gate pier structures in the district, contains non-submergible roller gates, employs non-standard length roller gates, contains both 1a and 1b tainter gates, and has no earthen embankment section. However, its two experimental, individually-operated tainter gates perhaps have as much engineering significance as the rest of the project with all these unusual features, most of which reflect Dam 20's early position in the evolutionary design process embodied in the project. Even some of the most major elements in the design had not been standardized by the time that Dam 20 was designed and built in August 1933. The central control station at complex 20 is also unique; it is the only 1a style central control station in the district. It was the first such building designed for a complex in the district and differed in size from all the rest. It was also apparently designed in August 1933, in conjunction with the dam rather than the lock. No evidence has been uncovered to date on whether it was built as part of either the lock, the dam, the esplanade, or as an entirely separate contract.

Starting in 1986, complex 20 was the first and, thus far, the only complex in the Rock Island District to begin to undergo major rehabilitation. Significant elements of the original fabric of the lock have already been replaced. The process, even at this one complex, is not completed yet. However, it is anticipated that eventually all of the Nine-Foot Channel Project complexes in the district will need to undergo major rehabilitation. By the end of 1989, all will reach or exceed their anticipated 50 year life span.

The complex 20-dam system consists of 34 1a-type tainter gates, 6-pound-type tainter gates, and three non-submergible roller gates. It does not include a stationary section. Lock dimensions are the standard 100 feet by 500 feet width additional footings for auxiliary lock of standard dimensions. Lock lift is 10.5 feet. Normal upper pool elevation is 480.0; this is about 15 feet above the tail waters of the dam at low water. When both pools are at their normal depths, the difference is reduced to 10 feet or less.

The lock and dam elements of the complex took about three years (or just about six months less than average) to complete at a cost of $4,450,000. The complex was placed in operation as a unit of the Upper Mississippi River Nine-Foot Navigation Project on November 20, 1935. It was the second of the 1931-1940 Upper Mississippi River Nine-Foot Navigation Project complexes in the Rock Island District to go on line.

PART II. TECHNOLOGICAL INFORMATION - LOCK

A. General Statement:

1. Design Character: Standardized Ohio-Mississippi Lock Design. Drawing Number M-L 20 20/1.

2. Condition of Fabric: Much historic fabric (particularly sacrificial finishes) replaced since 1986; replacement fabric in excellent condition.

B. Description of General Layout and Principal Elements:

1. Overall dimensions: Main lock chamber - 110 feet wide by 600 feet long by 40 feet high: adjoining incomplete auxiliary lock chamber 110 feet wide by 40 feet high. Lift - 10.5 feet. Drawing Number M-L 20 20/1.

2. Foundations: Bedrock. Original plans called for building upper guidewall on timber crib and wood pile foundation bearing directly on ledge rock. But after the investigation showed the ledge rock to have a riverward slope of about two to three feet in the width of the wall, the Corps considered it advisable to found the wall directly on ledge rock. Increased cost of construction over $27,000.00.

3. Walls: Reinforced monolithic concrete with steel rub bars on their chamberward faces upstream and downstream from the lock gates. Land wAll adjoins Missouri shore. Intermediate wall is riverward wall of main lock and landward wall of incomplete auxiliary lock. River wall of auxiliary lock ties to dam on east. The walls are in the process of being resurfaced in major rehabilitation which began in 1986. Drawing number M-L 20 20/8.

4. Structural System: See above.

5. Bullnoses: Concrete configurations at each end of intermediate wall. Drawing number M-L 20 20/12.

6. Upper and Lower Guidewalls: Extended monolithic reinforced concrete walls extending the landwall out of the lock chamber at either end to assist guiding of barge traffic into the lock. The guidewalls are in the process of being resurfaced in major rehabilitation which began in 1986. Drawing number M-L 20 20/8.

7. Riverwall Extension: 500-foot long cell foundation, concrete extension to upstream end of riverwall. Added 1940-42. To assist in counteracting outdraft which made navigation into and out of the upstream end of the lock difficult. The extension is in the process of being resurfaced in major rehabilitation which began in 1986. Drawing number M-L 20 10/19A; M-0 32/11.

8. Guidewall Extension: Concrete-covered extension to upstream guidewall. Added in 1951 to assist in counteracting outdraft which made navigation into and out of the upstream end of the lock difficult. The extension is in the process of being resurfaced in major rehabilitation which began in 1986.

9. Stage Recorder: Small concrete housing located at the end of the downstream guidewall. Equipment housed for the recording of river stages.

C. Mechanical Equipment:

1. Tainter Valves: Four cable drive lock valves of steel construction with electric motorized assembly. Valves are located in wells in lock walls. They are operated by switches in weather-proof control cabinets on lock walls, with a cabinet beside each gate recess. Control cabinets on landwall surrounded by metal and glass shelters since mid-1970s. Electric-motorized operating equipment and electrical switches, etc., which operate these assemblies, were replaced between 1986 and 1988 in a major rehabilitation of the lock. Drawing numbers M-L 20 25/1; 20/25.

2. Gates: Two pairs of miter gates on main lock and one pair on upstream end of incomplete auxiliary lock. All three pairs are balanced on stainless steel pintels. Those in main lock are operated by arms, gears, and electric motor assemblies. The miter gates on the main lock underwent major rehabilitation between 1986 and 1988, with much of the original fabric replaced or rebuilt. Motor assemblies originally housed in machinery pits in lock walls adjacent to each leaf. Motor assemblies were replaced between 1986 and 1988 in major rehabilitation of lock. The gates are operated by switches in control cabinets; switching assemblies also replaced between 1986 and 1988. Bumper lines of chamber face of gates also of stainless steel. All

other associated metal parts are of steel, stainless steel, or steel/nickel alloy. Drawing numbers M-L 20 21/1; 21/17; 20/26; 20/27.

3. Lighting: Various freestanding single and double head lighting standards, installed in 1984.

4. Plumbing: Lock is watered by the Tainter valves (see previous page) serving a system of cast-in-place tunnels that enable the water level to be controlled on the interior of the lock.

5. Haulage Unit: Motorized winch assembly to assist towing of barges through lockage. Replacement units were installed in the mid-1970s.

6. Traveling Mooring Kevels: Two large cleats on rails which extends the length of both the upstream and downstream guidewalls. Installed in 1980, the kevels are used to assist towing of barges through lockage.

D. Other Elements:

1. Auxiliary Lock: Fixed miter gate without machinery and partial walls are located riverward of the main lock. It is equipped with wells for machinery placement, but was never completed or put into service. Drawing Numbers M-L 20 20/1; 20/3.

2. Boat Launches: Built ca. 1955, the launches are single-armed derricks of metal construction, built on site for use in pulling operating machinery out of machine pits when threatened by floods.

PART III. TECHNOLOGICAL INFORMATION--MOVABLE SECTION OF DAM

A. General Statement:

1. Design Character: Combination roller/tainter low dam system design. Drawing Number M-L 20 40/1.

2. Architectural Character: 1c roller gate piers. Drawing Number M-L 20 41/1

3. Condition of Fabric: Much historic fabric (particularly sacrificial finishes) replaced since 1986; replacement fabric in excellent condition.

B. Description of Exterior

1. Overall Dimensions: 2,369 feet in length. Drawing Number M-L 20 40/1.

2. Foundation: Bedrock

3. Pier House Walls: Monolithic reinforced concrete. Drawing Numbers M-L 20 41/1 and 41/2.

4. Structural System: Monolithic concrete/structural steel.

5. Fenders: Concrete fenders located at the base of each pier.

6. Openings:

a. In Overall Structures: 43 water-channels and 10 archways; clustered in groups by sizes, west to east--12 water-channels ca. 40 feet wide; 3 water-channels ca. 60 feet wide; 28 water-channels ca. 40 feet wide; 10 archways ca. 20 feet wide. Drawing Number M-L 20 40/1.

b. In Pier Houses: 1 doorway and 6 eight-pane windows for each of four pier houses. Drawing Number M-L 20 40/1.

(1) Doorways and doors: 4

(2) Windows: 24

c. In Access Tower: 2 doorways and doors. Drawing Number M-L 20 40/2.

7. Roofs:

a. Shape, covering: Pier houses have hipped roofs covered in tile shingles. Drawing Number M-L 20 41/3.

b. Towers, abutments, piers: 2 abutments; lockwall abutments includes access tower; 53 piers (38 tainter gate piers, 2 lc-style roller gate piers, 1 lc-style transition piers or combination tainter and roller gate piers, and 11 service bridge extension piers); 4 lc-style piers have pier house towers. Drawing Numbers M-L 20 40/1; 40/2; 40/18; 40/3; 40/4; 40/5; 40/7; 40/8; 40/9; 40/21.

8. Service Bridge:

a. Shape: Linear deck truss spans in a segmental series.

b. Materials: Structural steel. Drawing Number M-L 20 53/1.

C. Description of General Layout and Principal Elements:

1. Access Plan: Simple stairway in the access tower which itself is part of the abutment resting on the riverwall of the auxiliary lock. This stairway leads to service bridge deck where walkway/rail tracks extend full length of dam. Access to all four pier houses directly off deck. Access to storage yard below easternmost 255 feet of dam by simple exposed stairway at the eastern end of service bridge. Drawing Numbers M-L 20 40/1; 40/2; 53/1; 53/5; 53/6.

2. Stairways: In access tower-reinforced concrete with pipe railing; at end of service bridge extension--open metal with pipe railing. Drawing Numbers M-L 20 40/2; 53/1.

3. Flooring: In pier houses and access tower--reinforced concrete; on service bridge deck--wooden plank. Drawing Numbers M-L 20 40/2; 53/5; 53/6.

4. Wall and Ceiling Finish: Reinforced concrete. Drawing Numbers M-L 20 40/2; 40/5; 41/1 41/2.

5. Hardware: Brass.

D. Mechanical Equipment:

1. Movable Gates: Two 40-foot-wide by 20 feet high, 1a-type Tainter gates operated by line shafts and motors housed in installations above each gate--operating machinery on both in process of being replaced in major rehabilitation which began in 1986; 32 40-foot-wide by 20 feet high 1a Tainter gates operated by specially-designed hoist cars riding on the service bridge--operating machinery on all are in process of being replaced in major rehabilitation project which began in 1986; six 40-foot-wide by 20 feet high, 1b-type (3-foot submersible) Tainter gates operated by specially-designed hoist cars riding on the service bridge--operating machinery on all are in the process of being replaced in major rehabilitation project which began in 1986; and three 60-foot-wide by 20 feet high, submersible roller gates operated on tooth track by chain driven hoist machinery located in pier house adjacent to each gate. Drawing Numbers M-L 20 48/1; 48/2; 48/5; 47/1; 47/2; 48/8; 48/9; 48/10; 48/11; 53/8; 53/9; 53/10; 53/13.

2. Movable Crane: 30-ton vertical lift electric crane with 70-foot boom (replaced in 1983-84) used for moving parts and equipment. Sits on original (ca. 1934) crane trolley. Trolley rides on 15-gauge track system running entire length of service bridge deck. Drawing Numbers M-L 20 3=48/1; 48/2; 48/5; 47/1; 47/2; 48/8; 48/9; 48/10; 48/11; 53/8; 53/9; 53/10; 53/13.

3. Electric-Motor-Operated Traveling Tainter Gate Hoist Cars: Two specially-designed hoist cars used for raising and lowering the 38 Tainter gates which originally had no individual operating motors. One sits on a spur of 15-gauge track located on service bridge extension and has been abandoned since 1986. The other rides on a 15-gauge track system running the entire length of the service bridge deck and has been rehabilitated since 1986.

4. Gasoline-Motor-Operated Traveling Tainter Gate Hoist Car: One specially-designed hoist car used for raising and lowering the 39 Tainter gates which originally had no individual operating motors. Abandoned since ca. 1945, the car sits on a side spur of 15-gauge track located on service bridge extension.

5. Flatcar Assembly: Car is used for transport of gate bulkheads and repair materials and also sites on side spur of 15-gauge track located on service bridge extension.

6. Lighting: Fixtures as of times of installation - 1933-34. Rewiring may have taken place over the years--extent is unknown. Drawing Number M-L 20 56/5.

E. Other Elements:

1. Emergency Bulkheads: Temporary block units of riveted structural steel girder construction placed in gate openings in periods of emergency or repair. Drawing Numbers M-L 20 58/1; 58/2; 58/3.

2. Emergency Bulkhead Car/Tracks: Located in storage yard, the flat cars designed to store and access bulkheads. Drawing Number M-L 20 40/30.

3. Storage Yard: 250-foot-long area extending from west abutment under service bridge extension, i.e., under last six archways in dam. The yard contains replacement parts for generating machinery. Drawing Number M-L 20 40/30.

PART IV: TECHNOLOGICAL INFORMATION-ESPLANADE AREA

A. Description of Esplanade--General Layout:

1. Design Character: Standardized park/service area and access road component. The main esplanade area was originally designed to accommodate the Central Control Station, Lockmaster and Assistant Lockmaster Residences, parking, and other service-related functions. The access roadway crosses the Gregory Diversion Ditch and therefore includes an access bridge. Major site alterations have occurred since that time and are noted in the following items.

2. Architectural Character: 1a Central Control Station. Drawing Number M-L 20 70/1.

3. Historic Landscape Design: Based on standardized designs--see drawings for Lockmaster's residences. Drawing Number M-L 20 38/1.

B. Condition of Site and Structures: Altered

1. Central Control Station - Exterior: Standardized 1a construction. Drawing Number M-L 20 70/1.

   a. First Floor: Contains machinery room, bathroom, main office, and basement stairway access. Standby generator which dominated machinery room removed in mid-1970s. Central control panel removed from machinery room between 1986 and 1988 as par of major rewiring of complex which was part of major rehabilitation of complex. Drawing Number M-L 20 70/2.

   b. Basement: Contains storage and equipment rooms. All interior finishes altered from original construction. Drawing Number M-L 20 70/2.

2. Lockmaster's/Assistant Lockmaster's Residences (standardized, Colonial Revival with side porch): The structures has been moved off site. Related structures, such as garage, have been demolished.

3. Outbuildings: Various shed and service buildings have been erected from time to time as demands required--none have particular significance or contribute to the site. A metal emergency generator building was constructed just upstream from the Central Control Station in the mid-1970s. It is a standardized element. A new garage structure of brick and steel was erected on the old site of the Lock Master's residence ca. 1980. This element is also standardized.

4. Access Bridge: Reinforced concrete foundation and structural system. Asphalt road surface. The 125-foot-long arched bridge spans the Gregory Diversion Ditch, running northeast to southwest.

PART V: SOURCES OF INFORMATION

A. Original Architectural/Engineering Drawings: Mississippi River Lock and Dam 20, lock operations folio, February 1936, file No. GP66-1; Mississippi River, Lock and Dam 20, dam operations folio, January 1940, file No. GP66-10; Rock Island District Office-Construction Drawings--Mississippi River Locks and Dams 1936-1986, (passim), Rock Island District Library, Clock Tower Building Annex, Rock Island, Illinois.

B. Early Views: Over 1,400 high quality 8x10 black and white construction photographs: Lock and Dam Number 20-Photo Book groups 121.14 (3 vols.), 2020, 121.59, 121.52 (2 vols.), Rock Island Arsenal, Rock Island, Illinois.

C. Interviews: Present and past personnel--Lock and Dam Number 20.

D. Bibliography:

1. Primary and unpublished sources: National Archives Record Group 77, Entry 81, Chicago National Archives and Records Center; National Archives Record Group 77, Entries 111 and 112, Washington National Records Center, Suitland, Maryland; Chief of Engineers Annual Reports, 1927-1987; see also bibliography in HAER No. IA-23 narrative history.

2. Secondary and published sources: See bibliography in HAER No. IA-23 narrative history.

E. Likely Sources Not Yet Investigated: National Archives Record Group 77, Entry 107 (132 linear feet), Washington National Records Center, Suitland, Maryland; National Archives Record Group 77, Entry 1656, exact repository unknown; and National Archives Record Group 77, Entries 608, 609, and 610 (collective total 5 linear feet), National Archives, Washington, DC.

F. Supplemental Material: 83 film canisters of 1931-1939 silent movies of the construction process taken by the Corps of Engineers, Rock Island District Office, Rock Island Arsenal, Rock Island, Illinois.

G. Notes: The notes for this routine are contained in the notes section of HAER No. IA-23 narrative history.